

Integrator's manual Function block: ROD_Scanner_FB

Author	jkopp
SW Version	2.0
Date	29.9.2026
Language	English

Table of Contents

Table of Contents	2
1 Revision History.....	3
1.1 Disclaimer statement	3
2 Glossary	4
3 Inputs of Function Block	5
4 Outputs of Function Block	6
5 ROD configuration	7
6 Start with Function block.....	8
6.1 IP address	8
6.2 TCP ID.....	9
6.3 Interface ID	9
6.4 Port	9
7 Using the Function block.....	10
8 Possible problems	12
8.1 More connections	12
8.2 Limited network	12
9 Diagnostic	14

1 Revision History

Document version: v1.0 9/2026

Authors: JKopp

1.1 Disclaimer statement

This function block example is provided for reference purposes only. It is not a production ready program, and we do not guarantee its correct operation under all circumstances, hardware configurations, system environments, or customer-specific application scenarios.

The customer is solely responsible for evaluating, modifying, and validating the example as necessary to ensure it is suitable for their specific application and operating environment.

This example is not intended to be used "as is" without sufficient programming knowledge or without appropriate testing and verification.

Its purpose is to serve as a starting point and to simplify the integration process by illustrating possible implementation approaches.

It should be adapted as needed to meet the requirements of the intended application.

2 Glossary

Acronym	Acronym meaning
FB	Function Block
PC	Personal Computer
PLC	Programmable Logic Controller
PN	PROFINET
ROD	ROD type of laser scanner (lidar)
TCP	Transmission Control Protocol

3 Inputs of Function Block

FB inputs table

Name	Type	Comment
EN_C	Bool	Enable connection Input = 1 – function block is prepared for TCP connection to ROD scanner Input = 0 – TCP connection is terminated It is necessary to set EN_C to 1 before enabling of receiving or the TCP connection will not be established
IPAddress	Array [0..3] of Byte	IP address of ROD scanner (default: 192.168.60.101) The address is set in ROD Config Software
TCP_ID	CONN_OUC	ID of TCP connection Unique for every FB/scanner Value range: W#16#0001 to W#16#0FFF
internalTCP_ID	CONN_OUC	ID of internal TCP connection Unique for every FB, it must not be equal to TCP_ID input Value range: W#16#0001 to W#16#0FFF
interfaceID	HW_ANY	ID of the local PN/IE interface
devicePort	UInt	TCP port number of ROD scanner The port is set in ROD Config Software (default: 3050)
localPort	UInt	TCP port number of local device (PLC)
enableReceive	Bool	Enable receiving Input = 1 – TCP connection is established and function block should start receiving measured data from ROD scanner (EN_C dependent) Input = 0 – Receiving of data is terminated, but if input was equal 1 before, the TCP connection is still established (termination by EN_C = 0)

4 Outputs of Function Block

FB outputs table

Name	Type	Comment
dataDistance	Array [0..1500] of DInt	Received data transformed to cartesian coordinates.
dataIntensity	Array [0..750] of DInt	Received measured intensity data of each individual lidars laser beam (if activated in ROD scanner)
intensityON	Bool	Information if intensity measuring is activated Output = 1 – receiving intensity data Output = 0 – not receiving intensity data
Status	String	Specification of internal error
error	Bool	Information that internal error appeared

5 ROD configuration

NOTICE



- It is necessary to read vendors manual for ROD scanner before using the function block.

Configuration of scanner is limited only by setting of:

- Output protocol – Output protocol must be set to TCP
- Scanner frequency – Simatic S7-1200 max 50Hz, Simatic S7-1500 no limitation
- Data output direction – Clockwise
- Size of output data – It is possible to set any measuring values, but all output data needs to be contained by one packet (max 1433 bytes of data). The FB will not work, if one scan will be divided to multiple packets (error message will appear).

6 Start with Function block

6.1 IP address

Set IP address of ROD scanner to input "IPAddress" in format "array of bytes 0-3". (Figure 2)
Default value for new scanner is 192.168.60.101.

Figure 1

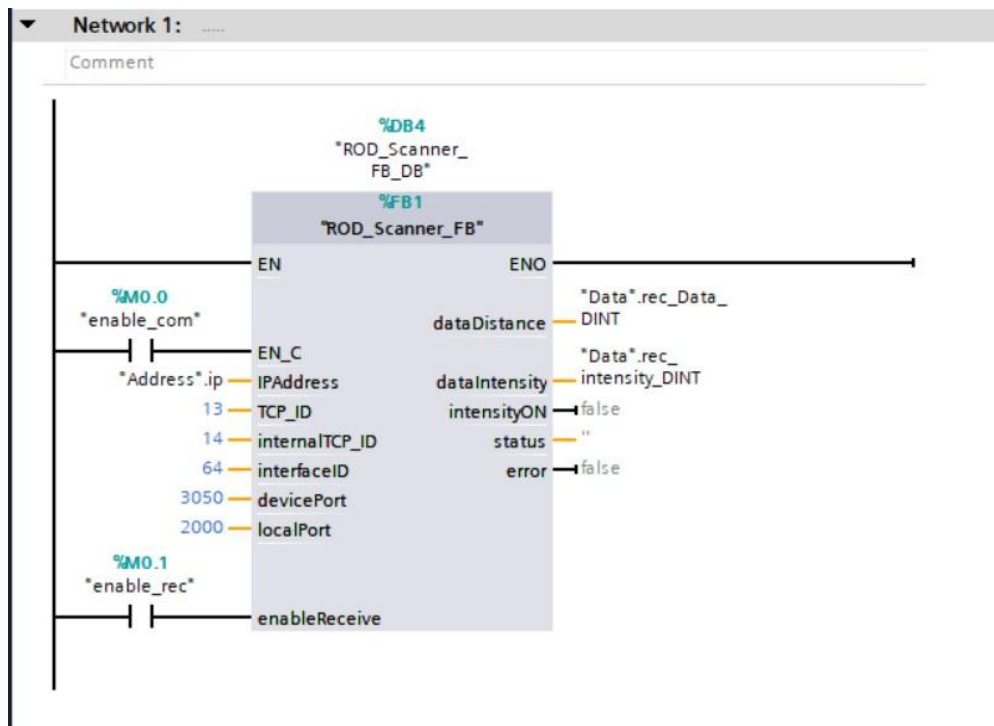


Figure 2

ROD_Scanner_Example_v2 ▸ PLC_1 [CPU 1214FC DC/DC/DC] ▸ Program blocks ▸ Address [DB2]						
Address						
	Name	Data type	Default value	Start value	Snapshot	Re
1	Static					
2	ip	Array[0..3] o...			—	
3	ip[0]	Byte	16#0	192	—	
4	ip[1]	Byte	16#0	168	—	
5	ip[2]	Byte	16#0	60	—	
6	ip[3]	Byte	16#0	101	—	

6.2 TCP ID

It is reference to the assigned connection and it must be unique.

“TCP_ID” is identifier of TCP connection with specific ROD scanner for receiving measured data.

“internalTCP_ID” is identifier for internal processes of function block.

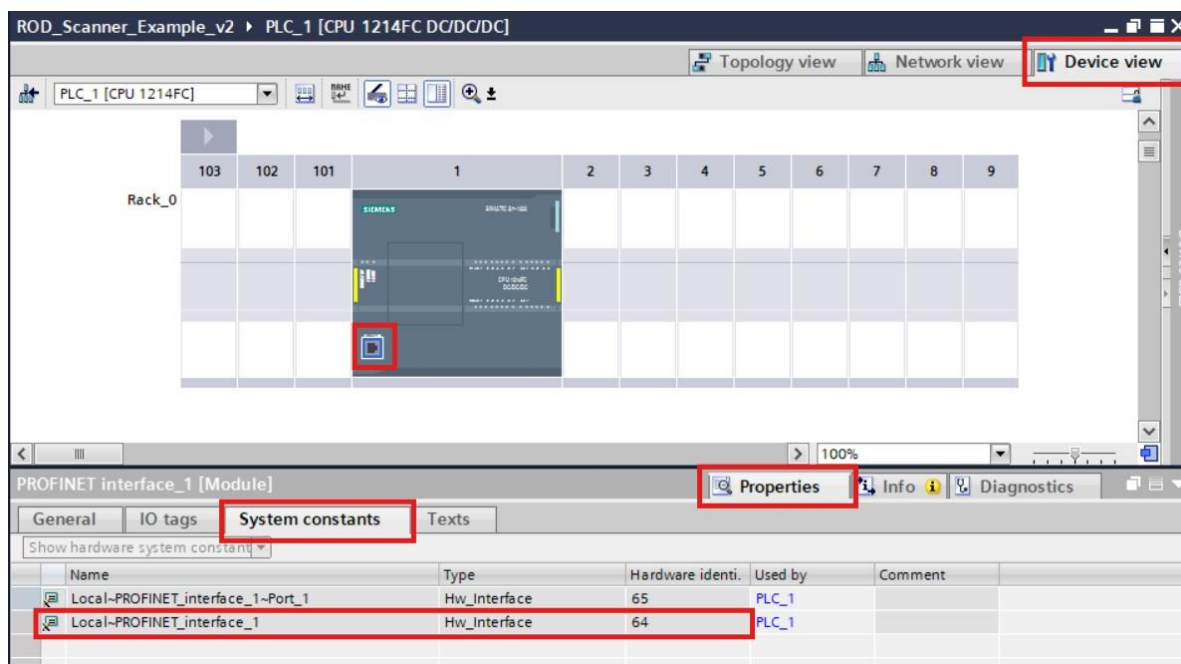
Both values have CONN_OUC data type (similar to word) with range W#16#0001 to W#16#0FFF, any value in this range can be selected.

“TCP_ID” and “internalTCP_ID” need to be UNIQUE for every used FB and they must NOT be equal to each other.

6.3 Interface ID

It is identifier of local profinet hardware interface (Figure 3).

Figure 3



6.4 Port

“devicePort” is port configured for ROD TCP communication and it can be changed in ROD configuration SW.

Default value for new scanner is 3050.

“localPort” is selected port of local profinet interface. Any free port can be selected.

7 Using the Function block

When the ROD scanner is turned ON and booted, FB can be used.

The input “EN_C” is set firstly to prepare FB to connection, then input “enableReceive” is set to start receiving of data. This order is necessary for proper function of FB, in case of different order the data will not be received and nothing will happen (in this case reset both inputs and use correct order).

If setting and input values are correct, then the FB should start receiving data, transfer them to cartesian coordinates and put then to output “dataDistance”.

In case of ROD configuration to send intensity data, the FB will also receive intensity and put it to output “dataIntensity”. This functionality is signalized by output “intensityON”.

Distance data is sorted from the first scanners laser beam to the last (clockwise), always in pair. The first value of pair is X coordinate and the second value is Y coordinate.

From example in Figure 4, “rec_Data_DINT[0]” is X1 value, “rec_Data_DINT[1]” is Y1 value, “rec_Data_DINT[2]” is X2, “rec_Data_DINT[3]” is Y2 and so on.

Figure 4

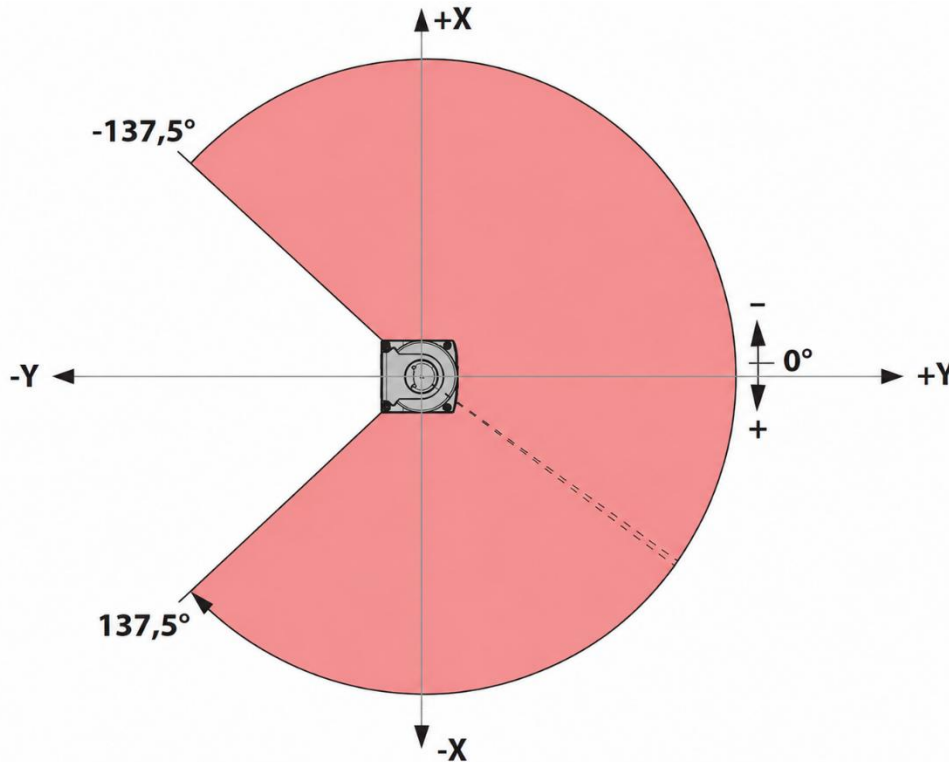
ROD_Scanner_Example_v2 ▶ PLC_1 [CPU 1214FC DC/DC/DC] ▶ Program blocks ▶ Data [DB3]

Keep actual values Snapshot Copy snapshots to start values Load start values as actual values

	Name	Data type	De...	St...	Sna...	Monitor value	Retain	Accessible f...	Writa...	Visible in ...	Setpoint	Supervision
1	Static											
2	rec_Data_DINT	Array[0..1500] of Dint			—			☒	☒	☒	☐	
3	rec_Data_DINT[0]	Dint	0	0	—	165		☒	☒	☒	☐	
4	rec_Data_DINT[1]	Dint	0	0	—	-180		☒	☒	☒	☐	
5	rec_Data_DINT[2]	Dint	0	0	—	165		☒	☒	☒	☐	
6	rec_Data_DINT[3]	Dint	0	0	—	-178		☒	☒	☒	☐	
7	rec_Data_DINT[4]	Dint	0	0	—	165		☒	☒	☒	☐	
8	rec_Data_DINT[5]	Dint	0	0	—	-176		☒	☒	☒	☐	
9	rec_Data_DINT[6]	Dint	0	0	—	165		☒	☒	☒	☐	
10	rec_Data_DINT[7]	Dint	0	0	—	-173		☒	☒	☒	☐	
11	rec_Data_DINT[8]	Dint	0	0	—	166		☒	☒	☒	☐	
12	rec_Data_DINT[9]	Dint	0	0	—	-172		☒	☒	☒	☐	
13	rec_Data_DINT[10]	Dint	0	0	—	166		☒	☒	☒	☐	
14	rec_Data_DINT[11]	Dint	0	0	—	-169		☒	☒	☒	☐	
15	rec_Data_DINT[12]	Dint	0	0	—	166		☒	☒	☒	☐	
16	rec_Data_DINT[13]	Dint	0	0	—	-167		☒	☒	☒	☐	
17	rec_Data_DINT[14]	Dint	0	0	—	165		☒	☒	☒	☐	
18	rec_Data_DINT[15]	Dint	0	0	—	-164		☒	☒	☒	☐	
19	rec_Data_DINT[16]	Dint	0	0	—	166		☒	☒	☒	☐	
20	rec_Data_DINT[17]	Dint	0	0	—	-163		☒	☒	☒	☐	
21	rec_Data_DINT[18]	Dint	0	0	—	166		☒	☒	☒	☐	
22	rec_Data_DINT[19]	Dint	0	0	—	-160		☒	☒	☒	☐	
23	rec_Data_DINT[20]	Dint	0	0	—	167		☒	☒	☒	☐	
24	rec_Data_DINT[21]	Dint	0	0	—	-159		☒	☒	☒	☐	
25	rec_Data_DINT[22]	Dint	0	0	—	166		☒	☒	☒	☐	
26	rec_Data_DINT[23]	Dint	0	0	—	-156		☒	☒	☒	☐	

Orientation in space of X and Y axes is showed in the Figure 5.

Figure 5



For better understanding, let's say the ROD scanner is set for its whole range ($-137,5^\circ$ to $137,5^\circ$). The first laser beam measures distance of obstacle in angle $-137,5^\circ$. This value is transferred to cartesian coordinates. That means x and y position ($X1, Y1$) of point, where the first beam intercourse with obstacle. If the step of measurement is e.g. $1,5^\circ$, then the second beam measures in angle -136° , from which is calculated another pair of coordinates ($X2, Y2$).

Number of received pairs of coordinates is equal to differential of first and last beam angle, then divided by measurement step.

In case of ROD configuration to send intensity data, the scanner is sending one intensity value for each laser beam, that means there is the same number of intensity values like number of position pair values (Figure 6).

Figure 6

ROD_Scanner_Example_v2 ▶ PLC_1 [CPU 1214FC DC/DC/DC] ▶ Program blocks ▶ Data [DB3]

Keep actual values Snapshot Copy snapshots to start values Load start values as actual values

	Name	Data type	De...	S...	Sna...	Monitor value	Retain	Accessible f...	Writa...	Visible in ...	Setpoint	Supervision
1	Static											
2	rec_Data_DINT	Array[0..1500] of D...			—			☒	☒	☒	☐	
3	rec_intensity_DINT	Array[0..750] of Dint			—			☒	☒	☒	☐	
4	rec_intensity_DINT[0]	Dint	0	0	—	632		☒	☒	☒	☐	
5	rec_intensity_DINT[1]	Dint	0	0	—	639		☒	☒	☒	☐	
6	rec_intensity_DINT[2]	Dint	0	0	—	642		☒	☒	☒	☐	
7	rec_intensity_DINT[3]	Dint	0	0	—	636		☒	☒	☒	☐	
8	rec_intensity_DINT[4]	Dint	0	0	—	638		☒	☒	☒	☐	
9	rec_intensity_DINT[5]	Dint	0	0	—	618		☒	☒	☒	☐	
10	rec_intensity_DINT[6]	Dint	0	0	—	634		☒	☒	☒	☐	
11	rec_intensity_DINT[7]	Dint	0	0	—	122		☒	☒	☒	☐	
12	rec_intensity_DINT[8]	Dint	0	0	—	179		☒	☒	☒	☐	
13	rec_intensity_DINT[9]	Dint	0	0	—	333		☒	☒	☒	☐	
14	rec_intensity_DINT[10]	Dint	0	0	—	195		☒	☒	☒	☐	
15	rec_intensity_DINT[11]	Dint	0	0	—	214		☒	☒	☒	☐	
16	rec_intensity_DINT[12]	Dint	0	0	—	347		☒	☒	☒	☐	
17	rec_intensity_DINT[13]	Dint	0	0	—	345		☒	☒	☒	☐	
18	rec_intensity_DINT[14]	Dint	0	0	—	392		☒	☒	☒	☐	
19	rec_intensity_DINT[15]	Dint	0	0	—	822		☒	☒	☒	☐	
20	rec_intensity_DINT[16]	Dint	0	0	—	1051		☒	☒	☒	☐	
21	rec_intensity_DINT[17]	Dint	0	0	—	980		☒	☒	☒	☐	
22	rec_intensity_DINT[18]	Dint	0	0	—	618		☒	☒	☒	☐	
23	rec_intensity_DINT[19]	Dint	0	0	—	660		☒	☒	☒	☐	

8 Possible problems

There are several situations when the function block can work unexpectedly or doesn't work at all.

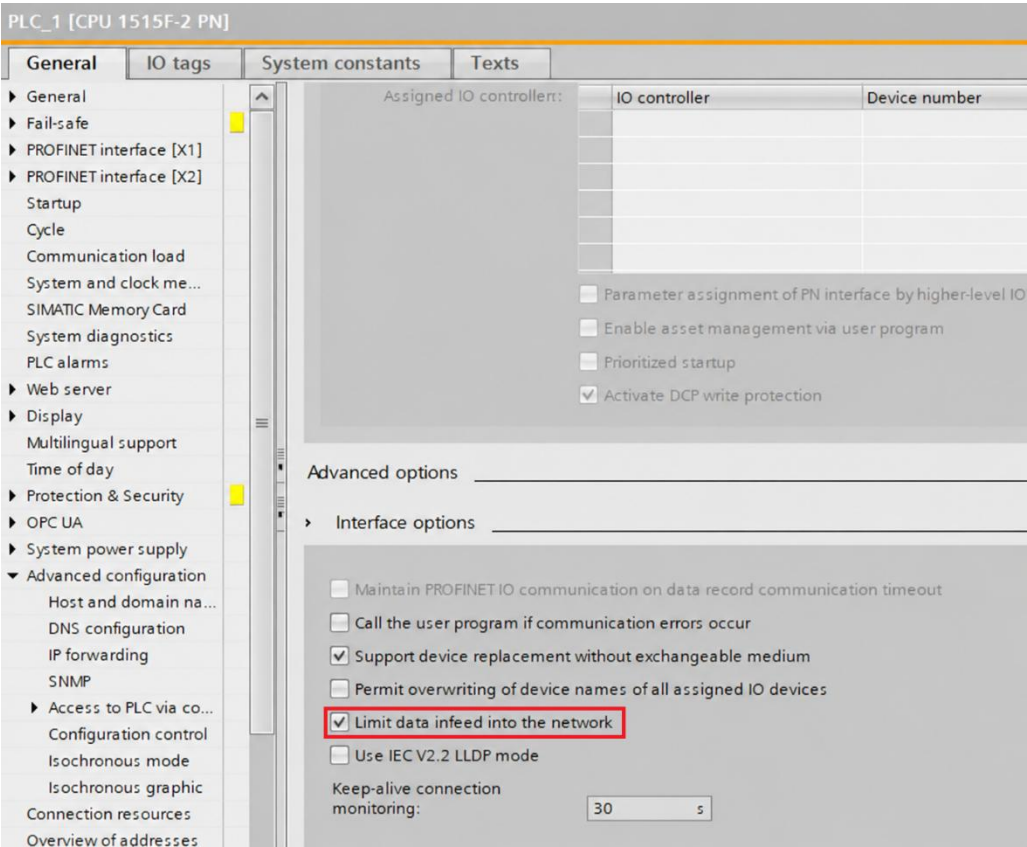
8.1 More connections

When PC with running ROD configuration SW is connected to the same network like PLC and ROD scanner, then the FB possibly will not create TCP connection with ROD, because there is already connection with config software.

8.2 Limited network

In the setting of PLC Simatic S7-1500 is option for limitation of data infeed from network. If this feature is active, the FB will not receive data from scanner (Figure 7).

Figure 7



9 Diagnostic

One of the FBs features is basic internal diagnostic. When any of covered issues occurred, the output “error” is set and output “status” shows error string. In the following table are described possible diagnostic messages.

FB outputs table

Error message	Meaning
Device is sending more packets from one scan	When the ROD scanner is set incorrectly, in this case the number of sending scanned beams (measured values) is too high for one packet, the message will appear and FB will not receive data.
TCP connection was not established	This message will appear in case of internal error from Siemens function for TCP connection and receiving.
Incorrect received data type	In header of TCP packets from scanner are basic data about scanners setting. One of them is type of receiving data. The FB is built for setting “data” and “data + intensity”. If the scanner is set for anything else, this message will be displayed.
Not receiving TCP	When FB stops receiving data from any reason (e.g. disconnected ROD scanner) this message will pop up after 3s.
Incorrect length of received packet	Message for case when the data length is changed in process of receiving.